THE EFFECT OF TUBERCULOSIS ON INTRATHORACIC RELATIONS.[1]

By Albert Philip Francine, A.M., M.D.,
INSTRUCTOR IN MEDICINE IN THE UNIVERSITY OF PENNSYLVANIA; VISITING PHYSICIAN TO THE DEPARTMENT OF TUBERCULOSIS OF THE PHILADELPHIA GENERAL HOSPITAL; PHYSICIAN-IN-CHIEF TO THE STATE TUBERCULOSIS DISPENSARY, PHILADELPHIA.

The following preliminary report deals with the changes brought about in intrathoracic relations as shown by skiagrams of cases of pulmonary tuberculosis, studied clinically before and after the taking of the *x*-ray plates. I will confine myself simply to the more salient features of this study, which deals with the alterations in the position of aorta, heart, and diaphragm. The presence or absence, of enlarged bronchial glands, and of calcareous infiltration in the costal cartilages of the ribs is also briefly considered.

When such a study is carried out with technical precision, it would seem to leave little room for error; because with the use of the modern tubes and coils, and instantaneous exposures, the resulting skiagrams are so clear cut and definitive as to give an admirable geographical chart. I believe that such a study gives more satisfactory results in regard to the position of the organs in life than those obtained by autopsy, for in the latter there is the postmortem change, due to alteration in intrathoracic pressure or to other strictly postmortem influences; there is also the trauma of the autopsy and consequent derangement of relations, and finally there is the question of elapsed time. I feel further that purely clinical studies of this nature, when unconfirmed by röntgenology, are without much accuracy or value, except in so far as in certain instances the personal equation of the investigator has given them such.

The value of röntgenography in the study of pulmonary tuberculosis, as supplementary to physical examination, is so generally recognized as to need no exposition. I shall not discuss the use of the *x*-rays from the standpoint of early diagnosis, but in their relations to the later pathological changes. Röntgenology must not, of course, be considered as having solved the problems of physical diagnosis of the chest, but it helps to elucidate them and to confirm the clinical findings. It has not and never can supplant nor minimize the importance of the time-honored clinical methods, but should on the contrary serve a useful purpose in stimulating more exact methods, because the possibilities of physical diagnosis are extended from the information and suggestions gleaned from the *x*-rays.

The cases from which this study is made were skiagraphed by

---

[1] Read at the XVI International Medical Congress, Budapest, August, 1909.

Dr. Charles Lester Leonard, of Philadelphia, and were in some instances patients from the Pennsylvania State Dispensary, No. 21, for Tuberculosis, and in others from private practice. The majority of the cases were moderately advanced and advanced cases (Class II and III of the National Association classification), though the only selection used was in the financial ability of the patient to bear the expense of the skiagrams. The number here reported is too small (that is, 60 cases) to warrant me in drawing any very definite conclusions, but the results are at least suggestive, and the conclusions which I do present relate only to this series.

I shall not attempt at this time to discuss the data gleaned from this study, in the light of present knowledge or views, but shall content myself with merely recording the details noted, pointing out where in certain instances the conclusions drawn are at variance with the views or opinions of others.

THE AORTA AND HEART. It should be noted that quite frequently in advanced pulmonary tuberculosis the aorta is displaced as well as the heart and in the same direction, usually to the right. In marked displacements of the heart this is the rule (Cases II, IV, VI, XII, XIII, XXV, XXVII, XXVIII, XLVI, XLVII, LII, LIX). Rarely the aorta may be drawn out of position, while the heart is unaffected (Case XXXIII). The error is sometimes made of interpreting the physical signs of a displaced aorta, as being those of enlarged glands or of aneurysmal dilatation. With an area of dulness to the right of the sternum in the second or third interspace and much displacement of the heart, the conclusion that the aorta is displaced is warranted, in the absence of definite signs of aneurysm. Rarely an aneurysmal dilatation of the aorta may be present.

It is noteworthy that in the present series, many of which were advanced or far advanced cases, the heart in the majority of instances was not displaced. There seems no doubt about this conclusion, and I therefore feel that those who hold that displacement of the heart is a reasonably constant sign or accompaniment of pulmonary tuberculosis are in error. Turban makes the statement that "it is exceptional to find the heart in its normal position in advanced chronic tuberculosis,"[2] while Pottenger says that displacement of the heart is a "typical and cardinal symptom" of tuberculosis of the right apex.[3]

In 63.33 per cent. of the cases the heart was not displaced (that is, in 38 cases, I, III, V, VII, VIII, X, XI, XIII, XIV, XVI, XVII, XIX, XX, XXI, XXII, XXIII, XXIV, XXVI, XXVIII, XXIX, XXX, XXXII, XXXIII, XXXV, XXXVII, XL, XLI, XLIV, XLVIII, XLIX, L, LI, LIII, LIV, LV, LVI, LVII, LX).

Absence of displacement is much more common, in fact almost the rule, in acute infiltrations and consolidations before fibrosis and contraction have taken place. In many instances even when the lesions were widespread and often destructive, the heart was not displaced. (Cases I, III, VIII, XI, XIII, XIV, XVI, XVII, XX, XXII, XXIII, XXIV, XXXII, XXXIII, XXXV, XLVIII, XLIX, L, LI, LVII). In Case XIII, with cavitation at the right apex and infiltration of the entire upper lobe, the heart was not displaced, due to pericardial adhesions over apex which could be plainly seen. In Case XXIII, with large cavities in both apices and much fibrosis, the heart was not displaced, possibly on account of the symmetrical character of the lesions, or possibly from adhesions. In Case XXIV (Fig. 1), with left-sided localized pneumothorax, the heart was not displaced. In Case XXXIII, with a large cavity on the right and complete consolidation of the right upper lobe, and moderate infiltration on the left, the heart was not displaced. In the following far-advanced cases with cavity the heart was not displaced: Cases XI, XIII, XIV, XXIII, XXIV, XXXIII, XLVIII, XLIX, L.

---

[2] Diagnosis and Treatment of Pulmonary Tuberculosis, 1908

[3] Diagnosis of Tuberculosis of the Lungs, 1906.

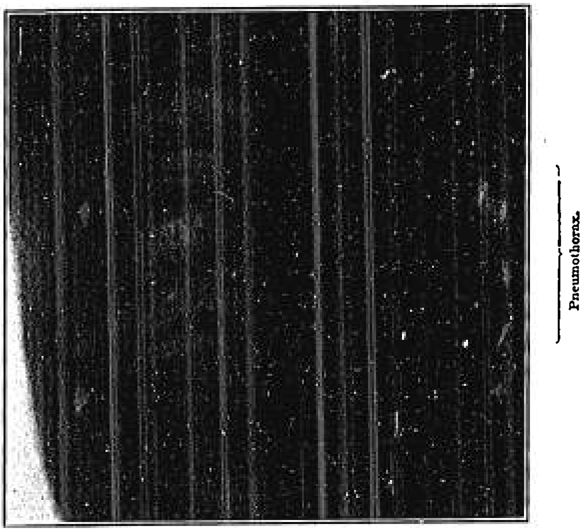

Fig. 1.—Case XXIV. Left-sided localized pneumothorax without displacement of the heart. The case belongs to Class III of the National Association classification.

The heart was displaced in 36.66 per cent. of this series, in 15 cases to the right (Cases II, IV, XII, XV, XXV, XXVII, XXXVI, XXXVIII, XLIII, XLV, XLVI, XLVII, LII, LVIII, LIX); in 3 cases to the left (Cases VI, IX, XXXI); and in 4 cases in the anteroposterior position (Cases XVIII, XXXIV, XXXIX, XLII), to be described later. I cannot, therefore, agree with the statement of Lawrason Brown[4] that "marked displacement of the heart occurs much more frequently to the left than the right."

On the contrary, when the pulmonary lesions are of fairly symmetrical character on both sides, the heart is more commonly displaced to the right than to the left (Cases II, XXV, XXXVI, LII, LVIII, LIX.) In these cases there is usually evidence to show that the primary and older lesion is on the right. When the lesion is more extensive on the left the heart is not so regularly displaced nor to the same extent, as in corresponding right-sided lesions (Cases I, III, XIV). In Case XIV, with cavity in the left apex and consolidation of the lung below, and moderate infiltration of the right apex, the heart was not displaced. Rarely the fibrosis of the lungs and pleuræ may be so great or of sufficient density to obliterate the boundaries of the heart (Case IX).

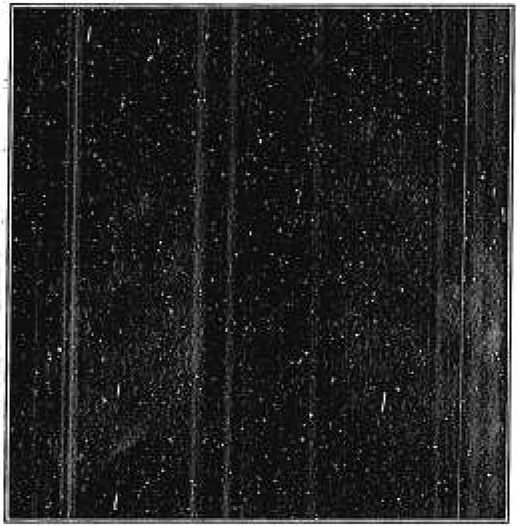

FIG. 2.—The heart in the anteroposterior position. Destructive lesions at both apices. The case belongs to Class III of the National Association classification.

---

[4] Amer. Jour. Med. Sci., 1908.

In 4 cases the heart occupied, what for want of a better term, I have called the anteroposterior position (Cases XVIII, XXXIV, XXXIX, XLII). In this position (Figs. 2 and 3) the heart assumes a long narrow appearance, as if it were turned upon its vertical axis. It should be noted that in all these cases, there were far advanced destructive lesions on both sides, and it might appear that the combined effect of the traction exerted under these conditions, had resulted in drawing the heart upward and inward, thus causing the apex to swing around. In long narrow chests the heart assumes a more oblique position. The angle formed with the liver on the right is less acute and the left boundary is appreciably more vertical. The heart also assumes an appreciably more oblique position during deep inspiration.

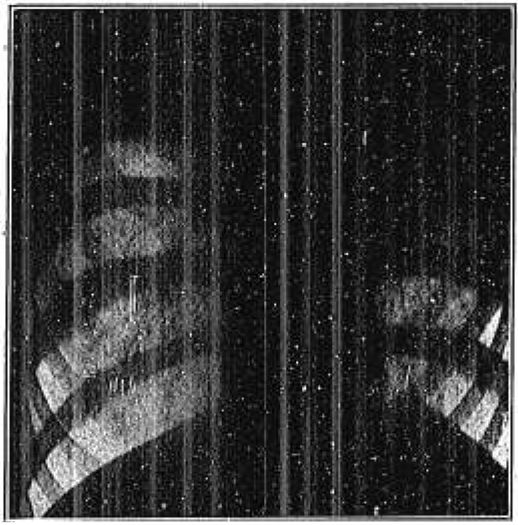

FIG. 3.—The heart in the anteroposterior position. Destructive lesions at both apices. The case belongs to Class III of the National Association classification.

In many cases the skiagrams show an interesting feature which is not demonstrable clinically, namely, that during systole of the heart there is an area between the lower boundary of the heart and the diaphragm of about the extent of one centimeter, which distinctly transmits the *x*-rays. The limits or extent of the cardiac excursion may also be seen in many cases. In four cases, distinct pericardial adhesions could be seen (Cases VII, XI, XIII, XVIII) The heart appeared normal in size both in the x-ray plates and to physical examination in all the cases with four exceptions (Cases XIX, XXIII, LVI, LIV). In three of these the enlargement was practically confined to the right side, and the lungs were markedly emphysematous. In Case XIX there was a general hypertrophy. There was no evidence of an organic valvular lesion in the series, though in some cases soft systolic murmurs were audible in the mitral and pulmonary areas.

THE DIAPHRAGM. The skiagrams were taken under full inspiration. In 29 cases (48.33 per cent.) the diaphragm was unaffected by the pulmonary lesion (Cases I, III, V, VII, X, XI, XIII, XVII, XIX, XX, XXI, XXIV, XXVI, XXVIII, XXIX, XXX, XXXII, XXXV, XL, XLI, XLIV, XLVIII, LI, LIV, LV, LVI, LVII, LX); the diaphragm was affected in this series in 51.66 per cent. of the cases. In 13 cases it was elevated on the right side (Cases II, VIII, XII, XV, XVI, XXII, XXV, XXXVIII, XLIII, XLV, XLIX, L, LVIII); in 5 cases on the left (Cases VI, XIV, XXVII, XXXI, LIII); in 7 cases it was elevated on both sides (Cases XVIII, XXIII, XXXIII, XXXIV, XXXVI, XXXIX, XLII); and in 6 cases it was not visible or determinable on account of the density of the adjacent involvement of the lungs and pleura (Cases IV, IX, XLVI, XLVII, LII, LIX).

In every case in which the heart was displaced the diaphragm was elevated on the side toward the displacement, and in the cases in which the heart assumed the anteroposterior position the diaphragm was elevated on both sides. There was one exception to this rule which does not properly apply as such, but in Case XXVII, which had been operated on for left-sided empyema some years previously, there was collapse of the chest wall, with consequent dragging upward of the diaphragm on that side, while the heart was displaced to the right.

The diaphragm was affected in 9 cases in which the position of the heart was normal (Cases VIII, XIV, XVI, XXII, XXIII, XXXIII, XLIX, L, LIII) (Fig. 4). In other words, the diaphragm was more sensitive to, or affected by, the presence of a pulmonary lesion than the heart in 15 per cent. of the cases. This was true in 5 advanced cases (Cases VIII, XIV, XXXIII, XLIX, L), as well as in 4 of the earlier cases (XVI, XXII, XXIII, LIII); and yet in 10 advanced cases in which one would have expected to find the diaphragm affected, it was not apparent (except in limitation of pulmonary excursion), either to physical examination or in the plates (Cases I, III, XI, XIII, XVII, XXIV, XXXV, XLVIII, LI, LVII). Thus in cases of relatively slight involvement the diaphragm may be elevated on the affected side (Case XXII, as type); while in cases with marked involvement and even cavitation the diaphragm may not be elevated (Case XIII as a type).

Thus the diaphragm had responded, in change of position, to the pulmonary lesion in only half the cases.

THE PERIBRONCHIAL LYMPH NODES. In every case in this series the cervical glands were enlarged to palpitation. It would seem probable that the peribronchial glands would also be affected in all cases, though this could not be deduced from the skiagrams. In 51.66 per cent. of the cases enlarged glands could be seen in the plates (Cases V, VII, VIII, X, XIII, XVII, XVIII, XIX, XX, XXI, XXII, XXIII, XXVI, XXVII, XXVIII, XXIX, XXX, XXXIV, XXXVII, XL, XLI, XLIII, XLIV, L, LI, LIII, LIV, LVI, LVII, LVIII, LX; 31 cases). With the exception of about 6 cases (Cases XIII, XVIII, XXIII, XXXIV, XLIII, L) all the cases in which enlarged glands were visible were either early or moderately advanced, without the breaking down of tissue; while in the large majority of the advanced cases the glands did not show. It would then appear as if there were two explanations for the absence of glands in the majority of plates in which they were not visible, namely, that their presence was concealed by the area of involvement, or what appears more likely, that with the advance

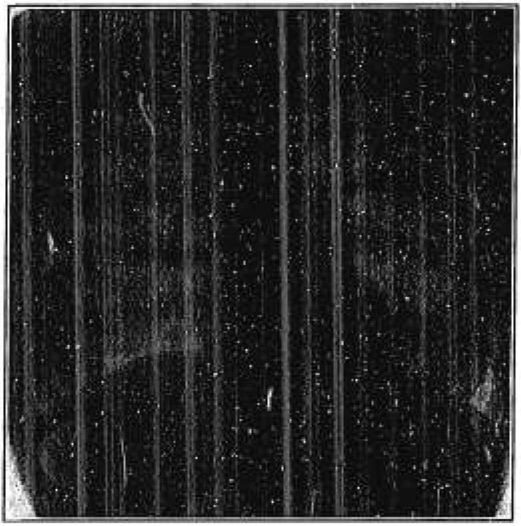

FIG. 4.—Showing the heart in the normal position, with the diaphragm elevated on the right. The enlarged peribronchial glands show well. The case belongs to Class I of the National Association classification.

of the disease the glands had softened or broken down and so failed to give rise to a shadow. There were usually only three or four glands noted in any one plate, and in a number of instances they appeared to be calcified.

CALCIFICATION OF COSTAL CARTILAGES. The presence of calcareous infiltration in the costal cartilages was noted in only 8 cases (Cases I, VIII, XIII, XXVI, XLIV, LII, LVI, LVIII). It would appear to be grossly absent in many cases in which its presence might be expected and in which it could no doubt, be demonstrated microscopically; it was generally noted in the advanced chronic type of the disease, though there were exceptions to this. It was usually confined to the costal cartilage of the first rib, though in one instance it involved them all (Case VIII). In the majority of the advanced cases the involvement was of sufficient density and extent to have concealed the presence of calcification in the cartilages of the first rib, but there was no evidence of calcification in the costal cartilages which could be properly studied.

SUMMARY OF CASES. CASE I.—F., adult female. Infiltration of upper right lobe. Consolidation of left upper lobe. Lesion more extensive and active on left. Heart normal in position and size. No glands visible. Diaphragm not elevated. Calcareous infiltration costal cartilage first rib. (Class III, N. A.[5])

CASE II.—A., adult male. Marked consolidation and fibrosis of upper half right lung, with large cavity in upper lobe. Infiltration of left upper lobe, cavity, with pneumonic consolidation left lower lobe. Heart completely displaced to right. Aorta markedly pulled over. Heart normal in size. No glands visible. Diaphragm elevated on right. Costal cartilages concealed by lesion. (Class III.)

CASE III.—H., adult male. Infiltration of right apex and left upper lobe. Heart normal in size and position. No glands visible. Diaphragm normal. No calcification of costal cartilages. (Class II.)

CASE IV.—N., adult male. Left-sided hydropneumothorax. Left lung completely collapsed. Disseminated lesions throughout right lung. Complete displacement of heart and aorta to right. Heart normal in size. No glands visible. Diaphragm not visible on left. No calcification. (Class III.)

CASE V.—O'C., boy, aged twelve years. Peribronchial infiltration on both sides radiating into apices. Peribronchial glands enlarged. Heart normal in size and position. Diaphragm normal. No calcification. (Class I.)

CASE VI.—J., adult female. Small cavity left apex with consolidation (fibroid) of left upper lobe. Slight infiltration right apex. Heart displaced moderately to left. Aorta also displaced. Heart normal in size. No glands visible. Diaphragm slightly raised on left. No calcification. (Class II.)

---

[5] N. A.—National Association for the Study and Prevention of Tuberculosis.

CASE VII.—J., adult male. Slight infiltration on right. Early case. Heart normal in size and position. Pericardial adhesion at apex. Peribronchial glands enlarged. Diaphragm normal. No calcification. (Class I.)

CASE VIII.—J., adult female. Fibroid consolidation both upper lobes, more marked on right. Heart normal size and position. Peribronchial glands enlarged, diaphragm elevated on right. Marked calcification of all costal cartilages. (Class II.)

CASE IX.—M., adult male. Large cavity at left apex, with complete fibroid consolidation of rest of lung. Left pleura greatly thickened. Consolidation of right upper lobe. Heart not distinguishable in skiagram, clinically displaced to left. Diaphragm not visible on left. No glands visible No calcification. (Class III.)

CASE X.—M., adult, male. Infiltration of both apices. Heart normal size and position. Peribronchial glands enlarged. Diaphragm normal. No calcification. (Class II.)

CASE XI.—S., adult, male. Small cavitation right apex, with consolidation right upper lobe. Consolidation left upper lobe. Heart normal in size and position. Pericardial adhesion. No glands visible. Diaphragm normal. No calcification. (Class III.)

CASE XII.—A., adult male. Infiltration right apex with marked fibrosis of right lower lobe. Left lung clear. Heart and aorta much displaced to right. Diaphragm much elevated on right. No glands visible. No calcification. (Class II.)

CASE XIII.—D., adult, male. Small cavity right apex, with infiltration of right upper lobe. Slight infiltration left apex. Heart normal size and position. Pericardial adhesions at apex. Glands enlarged. Diaphragm normal. Calcification first left costal cartilage. (Class II.)

CASE XIV.—R., adult, female. Cavity left apex with consolidation both left lobes. Infiltration right apex. Heart normal size and position. Diaphragm elevated on left. No glands. No calcification. (Class III.)

CASE XV.—D., adult, male. Large cavity right upper lobe, consolidation right upper lobe. Small cavity left upper lobe, with infiltration of left upper lobe. Heart displaced to right, normal in size. Diaphragm elevated on right. No glands. No calcification. (Class III.)

CASE XVI.—E., adult, male. Infiltration of both apices, more marked on right. Heart normal in size and position. No glands. Diaphragm elevated on right. No calcification. (Class II.)

CASE XVII.—V., adult, male. Infiltration both apices, more marked on right. Heart normal, size and position. Glands enlarged. Heart normal, size and position. Diaphragm normal. No calcification. (Class II.)

CASE XVIII.—R., adult, male. Large cavity right apex, another in upper lobe, with marked consolidation of middle lobe. Small cavity left apex with consolidation of left upper lobe. Anteroposterior position of heart. Aorta displaced to right. Pericardial adhesion right side. Glands enlarged. Diaphragm elevated equally both sides. No calcification. (Class III.)

CASE XIX.—S., girl, aged seventeen years. Infiltration of right apex, marked emphysema. Heart normal position. Glands enlarged. Diaphragm normal. No calcification. General hypertrophy of heart. (Class I.)

CASE XX.—S., adult, female. Infiltration left upper lobe. Heart normal, size and position. Diaphragm normal. Glands enlarged. No calcification. (Class II.)

CASE XXI.—V., adult, male. Infiltration roots of both lungs, radiating into apices. Heart normal size and position. Diaphragm normal. Glands enlarged. No calcification. (Class I.)

CASE XXII.—D., adult, female. Infiltration right upper lobe. Heart normal size and position. Glands enlarged. Diaphragm elevated on right. No calcification. (Class II.)

CASE XXIII.—C., adult, male. Cavities both apices, with consolidation both upper lobes. Marked emphysema. Heart normal in position, enlarged to right. Diaphragm elevated both sides. Glands enlarged. No calcification. (Class III.)

CASE XXIV.—Z., adult, male. Cavity left upper lobe. Left-sided localized pneumothorax over partially collapsed lung. Heart normal in size and position. Diaphragm depressed on left. No glands visible. No calcification. (Class III.)

CASE XXV.—D., adult, male. Cavity right apex, consolidation right upper lobe. Cavity left apex. Consolidation left upper lobe. Heart and aorta much displaced to right. Heart normal in size. Diaphragm elevated on right. No glands. No calcification. (Class III.)

CASE XXVI.—J., adult, female. Infiltration both apices. Tuberculous glands of neck (operative). Heart normal ni size and position. Glands enlarged. Diaphragm normal. Calcification of costal cartilage (left). (Class II.)

CASE XXVII.—S., adult, female. Left-sided emphysema (operative) complete collapse of left lung. Heart almost completely displaced to right. Aorta displaced to right. Diaphragm much elevated on left. Glands enlarged. No calcification. (Class III.)

CASE XXVIII.—P., boy. Infiltration right apex. Localized empyema on right. Fibrosis right lower lobe and pleura. Heart and aorta not displaced. Diaphragm normal. No calcification. Glands enlarged. (Class III.)

Case XXIX.—P., adult, female. Consolidation left apex. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class I.)

Case XXX.—U., adult, female. Infiltration right apex. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class I.)

Case XXXI.—H., adult, female. Cavity left apex. Consolidation left upper lobe, disseminated lesions below. Infiltration right apex. Heart slightly displaced to left. Diaphragm elevated on left. No glands. No calcification. (Class III.)

Case XXXII.—B., adult, male. Infiltration both apices. Heart normal size and position. Glands enlarged. Diaphragm normal. No glands. No calcification. (Class II.)

Case XXXIII.—A., adult, female. Large cavity right apex. with consolidation right upper lobe. Infiltration left upper lobe. Heart normal size and position. Aorta much displaced to right. Diaphragm elevated both sides. No glands. No calcification. (Class III.)

Case XXXIV.—C., adult, male. Cavities upper right lobe, with consolidation and marked calcification on right. Cavity left apex with marked consolidation and fibrosis. Heart in anteroposterior position. Diaphragm elevated on both sides. No calcification of costal cartilage. Calcified glands. (Class III.)

Case XXXV.—O., adult, male. Consolidation right upper and middle lobes. Infiltration of left upper lobe. Heart normal size and position. Diaphragm normal. No glands. No calcification. (Class III.)

Case XXXVI.—C., adult, male. Cavity at both apices, with consolidation and fibrosis of both upper lobes. Heart displaced to right. Diaphragm elevated on both sides. No glands. No calcification. (Class III.)

Case XXXVII.—S., adult, male. Infiltration both apices. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class II.)

Case XXXVIII.—O., adult, female. Large cavity right apex, consolidation of right upper lobe. Infiltration left upper lobe. Heart displaced to right. Diaphragm elevated on right. No glands. No calcification. (Class III.)

Case XXXIX.—D., adult, male. Large cavity left apex, consolidation left upper lobe. Infiltration right apex. Heart in anteroposterior position. Diaphragm elevated both sides. No glands. No calcification. (Class III.)

Case XL.—McV., adult, male. Infiltration right apex. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class I.)

Case XLI.—R., adult, female. Slight infiltration right apex. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class I.)

Case XLII.—T., adult, male. Large cavity right apex. Consolidation and fibrosis right upper and middle lobes. Cavity left apex consolidation, left upper lobe. Heart in anteroposterior position. Diaphragm elevated on both sides. No glands visible. No calcification. (Class III.)

Case XLIII.—M., adult, female. Cavities in right upper lobe, with consolidation and fibrosis. Consolidation left upper lobe. Heart displaced to right. Diaphragm elevated on right. Glands enlarged. No calcification visible. (Class III.)

Case XLIV.—McG., adult, male. Infiltration of right apex. Heart normal size and position. Diaphragm normal. Calcification of costal cartilage. Glands enlarged. (Class I.)

Case XLV.—G., adult, male. Large cavity right upper lobe. Consolidation and fibrosis upper and middle lobes. Infiltration left upper lobe. Heart displaced to right. Diaphragm elevated on right. No glands visible. No calcification. (Class III.)

Case XLVI.—L., adult, male. Large cavity in right upper lobe, another in middle lobe. Consolidation of lower lobe, marked fibrosis of right pleura. Consolidation left upper lobe. Heart and aorta much displaced to right. Diaphragm not visible on right. No glands visible. No calcification visible. (Class III.)

Case XLVII.—H., adult, male. Infiltration right apex. Large pleural effusion on left. Heart and aorta much displaced to right. No glands. No calcification. Diaphragm not visible on left. (Class II.)

Case XLVIII.—C., adult, male. Infiltration right apex. Infiltration, with cavity, left upper lobe. Heart normal size and position. Diaphragm normal. No glands. No calcification. (Class III.)

Case XLIX.—P., adult, female. Consolidation upper right lobe with softening. Infiltration left apex. Heart normal size and position. Diaphragm up on right. No glands. No calcification. (Class III.)

Case L.—M., adult, female. Cavity right apex, consolidation right upper lobe with softening. Infiltration left upper lobe. Heart normal size and position. Glands enlarged. Diaphragm elevated on right. No calcification. (Class III.)

Case LI.—M., adult, male. Infiltration right apex. Consolidation left upper lobe. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class II.)

Case LII.—A., adult, male. Large cavity right upper lobe, consolidation and marked fibrosis below. Large cavity left apex, consolidation of left upper lobe. Heart completely displaced to right. Aorta markedly displaced. Diaphragm not visible on right. No glands visible. Calcification of costal cartilages marked. (Class III.)

CASE LIII.—G., adult, male. Infiltration both apices. Heart normal size and position. Glands enlarged. Diaphragm elevated on left. No calcification. (Class II.)

CASE LIV.—Y., adult, male. Infiltration right apex. Heart normal size and position. Glands enlarged. Diaphragm normal. No calcification. (Class I.)

CASE LV.—M., adult, male. Infiltration both apices. Heart normal size and position. Diaphragm normal. No glands. No calcification. (Class II.)

CASE LVI.—E., adult, male. Disseminated lesions in both upper lobes, marked emphysema. Heart normal in position, enlarged to right. Glands enlarged. Diaphragm normal. Calcification of costal cartilage. (Class II.)

CASE LVII.—C., adult, male. Infiltration of both upper lobes. Heart normal in size and position. Glands enlarged. Diaphragm normal. Slight calcification. (Class II.)

CASE LVIII.—M., adult, male. Consolidation right upper lobe. Infiltration left upper lobe. Heart displaced to right. Enlarged to right. Glands enlarged. Slight calcification. Diaphragm elevated on right. (Class II.)

CASE LIX.—L., adult, male. Large cavities right upper lobe, with consolidation. Marked fibrosis of lungs and pleura, righ. lower lobe. Cavity left apex, with consolidation upper lobet Heart much displaced to right. Aorta displaced to right. Diaphragm not visible on right. No glands, no calcification visible. (Class III.)

CASE LX.—J., adult, female. Infiltration both apices. Heart normal in size and position. Glands enlarged. Diaphragm normal. No calcification. (Class II.)